OPERATING INSTRUCTIONS

for

TYPE 648-A STROBOLUX®

Form 522-F
May 1955

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Operating Instructions for Type 648-A Strobolux®

CONDENSED INSTRUCTIONS

1. Connect both Strobotac® and Strobolux® to a power source of the voltage and frequency marked on both instruments.
2. Connect Strobotac to Strobolux by jack-plug cable provided.
3. Connect contactor or switch to Strobotac if this control is to be used.
4. Turn ON both instruments.
5. Select desired control on Strobotac.
6. Adjust speed switch on Strobolux to give the best illumination.

SECTION I GENERAL

In very brightly-lighted rooms or when the illumination of a large object by stroboscopic light is required, the General Radio Type 648-A Strobolux provides a source of light that is at least one hundred times brighter than that obtained from the Strobotac. An area of several square feet may be effectively covered by a Strobolux.

The Strobolux consists of a control panel, a power supply and a lamp, all mounted in a metal carrying case. The lamp can be used as mounted in the carrying case or can be removed and used with the extension cord. The flashing rate can be controlled only by the General Radio Type 631 Strobotac. All control possibilities of the Strobotac are available in the Strobolux. (The upper flashing limit of the Strobolux is limited to approximately 6000 flashes per minute.) The tripping circuit from the Strobotac is carried to the Strobolux by the jack-plug cable provided.

SECTION II OPERATION

CAUTION: Be Sure That Panel Terminal Engraved G Is Connected to Ground Before Operating This Instrument.

Connect at D to a power source of the same voltage and frequency as shown on the rating plate. The Strobotac is connected to the Strobolux by the plug and jack cable. The power to the Strobolux unit is controlled by the ON-OFF switch C, the intensity of the light by the control switch B. The outlet F may be used for Strobotac power supply cable or a contactor as desired or convenient.

For single flash and very low speeds up to approximately 10 rpm the speed control switch should be in low position (left), for medium speeds, 10 rpm to 2500 rpm approximately, use the medium or center position, and for higher speeds the switch should be in the high position, or right. The maximum useful flashing rate of the Strobolux is limited to about 6000 rpm. The speeds and switch setting given above are only approximate and are given as a guide to the best position. If the light seems brighter at a different setting, no harm can result and this position should be used.

Long continuous operation often heats the lamp to a point where flashing is not uniform. It is suggested, under such conditions, that the switch be moved, if possible, to a faster position or the unit allowed to cool or run at a lower rate. The life of the tube depends upon the rate of flash and the position of the switch. Like any lamp, its life is increased by avoiding long periods of operation at maximum intensity.

SECTION III CONTROL

The control of the flashing rate of the Strobolux is obtained from the Strobotac. The Strobolux always operates under the conditions selected from the Strobotac control panel. Either the Type 631-B Strobotac (lower limit 600 rpm) or the Type 631-BL Strobotac (lower limit 60 rpm) can be used.

For speed measurements or stroboscopic work use the STROBOTAC LOW or HIGH position as necessary, remembering that the top useful limit of the Strobolux is about 6000 rpm. The LINE position gives a flashing rate synchronous with the line frequency.

For contactor or oscillator control plug in the CONTACTOR jack of the Strobotac, and select either CONTACTOR LOW or HIGH as desired. The Strobolux will follow the contactor rate. The Type 1535 Contactor is especially recommended for applications where a contactor is used.

For single flash work, plug a switch or other control into the CONTACTOR jack of the Strobotac, being sure that the speed switch of the Strobolux is set in the LOW position.

SECTION IV THE LAMP HOUSING

This housing is removable by loosening the two clamp screws L on the lamp panel and sliding the clips outward, releasing the rim. The lamp may then be removed and is connected by ten feet of flexible cable to the power supply. If cable kinks, unplug at lamp and replug after straightening. To replace lamp housing, unplug, wind cable on pins and plug into lamp again so that the unit may be used without removal from the case. Lamp housing should be firmly fastened to housing by clamping lugs. The lamp itself is replaceable by removing lens. Legs are provided on lamp housing and a socket with a

1/4 x 20 screw thread is available on the bottom of housing in case it is desirable to use a tripod. The Type 759-P11 tripod is available.

CAUTION: DO NOT DISCONNECT LAMP CABLE FROM LAMP WHEN EITHER STROBOLUX OR STROBOTAC IS RUNNING (POWER TURNED ON).

SECTION V PHOTOGRAPHY

Single-flash or multiple-flash photography of moving objects can be made by using the Strobolux as a light source. The extremely short duration of the flash (about 0.00005 second) makes it possible to arrest extremely rapid motion. The many variables entering into this type of photography make it difficult to give definite instructions for procedure, but a few general rules are outlined here.

(1) The object to be photographed should be prepared to obtain a high degree of light reflection, but this reflection should be diffused, avoiding, so far as possible, any specular reflection or highlights. In photographing machine parts, this can often be accomplished by painting the parts with a flat white paint.

(2) Use rapid lenses, f4.5 or faster, and fast emulsions.

(3) Place light as near as possible to the object to be photographed.

(4) The flash is "triggered" by a switch or other control plugged into the CONTACTOR position of the Strobotac. Timing of the flash is a matter that is usually best determined by experiment. A few trial shots will establish conditions better than pages of instructions.

(5) The mechanism for tripping the flash must usually be devised to fit the particular circumstances at hand. For single-flash photographs, a mechanical contact actuated by the phenomenon to be photographed is usually satisfactory. Photocell relay combination can also be used. For multiple photographs on a single plate a system giving a sequence of contacts must be used. The flashing means provided in the Strobotac is quite satisfactory.

SECTION VI REPLACEMENT OF PARTS

The Strobolux lamp is replaced by removing the lens from the lamp housing. This is held in place by the three screws and nuts around the edge. The lamp unscrews like a conventional light bulb after removing the two leads with spring fasteners. For replacement use the General Radio Type 648-P1 lamp.

Fuses are accessible by removing the chassis held by the four screws along the two edges of the panel. The fuses are located above the ON-OFF switch behind the panel. Refer the parts list for proper values.

A 6.3 volt minature bayonet-base lamp is used as an indication that the power supply is turned on. This may be replaced from the front of the panel by unscrewing the pilot bull's-eye.

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SECTION VII

SERVICE AND MAINTENANCE NOTES FOR THE TYPE 648-A STROBOLUX

7.1 FOREWORD

7.11 This Service Information together with the information given in the Operating Instructions should enable the user to locate and correct ordinary difficulties resulting from normal use.

7.12 Major service problems should be referred to the Service Department which will cooperate as far as possible by furnishing information and instructions as well as by furnishing any replacement parts which may be ordered. Detailed facts giving the type and serial number of the instrument and reference to any particular section of the Operating Instructions and Service Information with which difficulty was encountered should always be included.

7.13 Write to the Service Department for a Returned Material Tag which includes shipping instructions to insure proper handling and identification when returning the instrument for repairs. A purchase order covering repairs to the instrument returned should also be forwarded to avoid any unnecessary delays.

7.2 RESISTANCE TESTS

7.21 The following measurements can be quickly made with an ohmmeter. Be sure that the power cord is disconnected. All components except tubes are checked by connecting the ohmmeter between the points indicated.

7.22 GND refers to connection to the chassis.
Disconnect multipoint Jones plug from Lamp Housing.
All readings are subject to 10% variation.

7.23 Transformer

Terminals	Ohms
1-4	3.3 for 115-volt connection
	13.2 for 230-volt connection
5-7	0 without tube and pilot lamp
5-GND	0
6-GND	0
8-9	200
9-10	200

7.24 Multipoint Jones Socket at end of cable.
Consult wiring diagram in Figure 2 for terminal numbering.

Terminals	Ohms
15-16	1.0 Meg. * SPEED switch on HIGH
16-GND	0
13-GND	0
15-Transformer No. 8	3200

*Start with SPEED switch on HIGH and wait for meter reading to stop drifting (This is caused by the capacitors charging). Switch to MED. and LOW positions successively and notice meter kicks settling down to the above reading after the capacitors have charged. A sudden jump in the meter when switching from one position to another shows that the capacitors are not open circuit. Reversing ohmmeter leads will quickly duplicate these results for a further check.

7.25 Jones plug on Lamp housing.

Terminals	Ohms
13-spring on tube	2180
13-14	0.35

7.3 VOLTAGES

7.31 HIGH voltages are INVOLVED so be careful. The following measurements are not necessarily recommended but are included more as a matter of information and for cases where the above checks are incomplete. Use of the resistance tests in Section 7.2 are to be preferred.

7.32 Voltmeter of 20,000 ohms-per-volt d-c and 1000 ohms-per-volt a-c.

Line voltage 117 volts (234 volts)
Disconnect multipoint Jones plug from Lamp Housing.
Values are subject to 10% variation.

7.33 Transformer

Terminals	Volts a-c
1-4	117 (234)
5-7	5.5
8-10	1200

7.34 Rectifier Output

Terminals No. 15 and No. 16 of Multipoint Jones socket 800 volts d-c.

7.4 INOPERATIVE - PILOT LAMP DOES NOT LIGHT

7.41 Check fuses.

7.42 See that the power cord is not broken and that the input receptacle contacts are clean.

7.5 FUSES BLOW

7.51 Refer to Transformer resistance tests in Section 7.23.

7.52 Check or replace 5Z3 tube.

7.53 Check for shorted capacitor by referring to resistance tests, Section 7.24.

7.6 FLASH LAMP FLICKERS

7.61 Incorrect setting of SPEED switch.

7.62 Be sure that the Type 631-B Strobotac or other tripping device connected to the STROBOTAC jack operates correctly. The Strobotac should operate normally when connected to the STROBOTAC jack on the Strobolux when the Strobolux is turned OFF. Check the interconnecting cable and STROBOTAC jack for breaks or poor contact. Refer to Service Information in the Type 631-B Strobotac operating instruction book.

7.63 The tripping electrode which is the spring wound around the helical section of the flash tube can be moved nearer the base of the tube.

7.64 Check that leads to flash lamp are not touching each other or the reflector. See that the insulators are not broken or cracked.

7.65 Replace Type 648-P1 Flash if flickering occurs at speeds above 5000 rpm. and the flicker cannot be corrected by following Section 7.63 above. Sometimes erratic flashing of the tube will correct itself by allowing the tube to cool off but this is only a temporary cure.

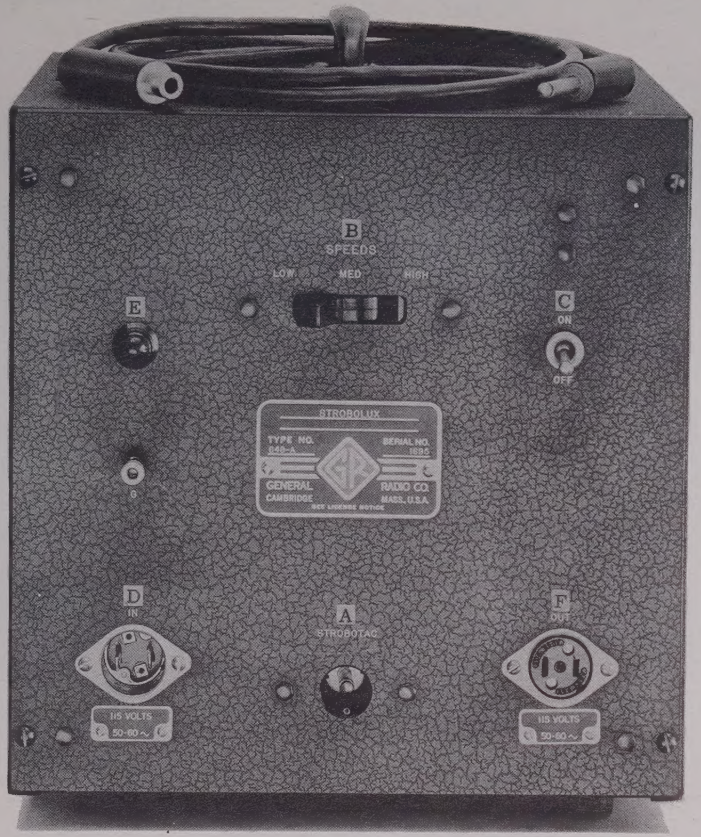
7.7 STROBOLUX FAILS TO FLASH

7.71 See Section 7.62 above.

7.72 Refer to Section 7.2 for resistance checks.

7.73 Flash lamp loose in socket.

7.74 The Strobolux will not flash alone. It must be used with a Strobotac. See Section III of the operating instructions.



SPECIFICATIONS

Range: Up to 100 flashes per second (6000 per minute). Single flashes for photography can also be obtained.

Duration of Flash: Between 15 and 50 microseconds, depending upon flashing speed and upon the setting of the SPEEDS range switch. The shorter flash is obtained at the higher speeds.

Accuracy: The accuracy is that of the source controlling the flashing speed. (See specifications for TYPE 631-B Strobotac.)

Power Supply: 105 to 125 (or 210 to 250) volts, 50 to 60 cycles.

Power Input: 125 watts, maximum.

Vacuum Tubes: One 5Z3 Rectifier and one TYPE 648-P1 Lamp, both of which are furnished with the instrument.

Mounting: Sheet metal case with black wrinkle finish. Lamp and its 9-inch reflector are mounted in one side of case, the power supply in the other. The removable lamp assembly is provided with a $\frac{1}{4}$ x 20 tapped hole for tripod mounting.

Accessories Required: A Strobotac is necessary to operate the Strobolux.

Accessories Supplied: Seven-foot power cord, cable for connection to Strobotac, extension cable for lamp, spare fuses.

Dimensions: $13\frac{5}{8}$ x $11\frac{5}{8}$ x $13\frac{1}{2}$ inches, over-all.

Net Weight: $31\frac{3}{4}$ pounds.

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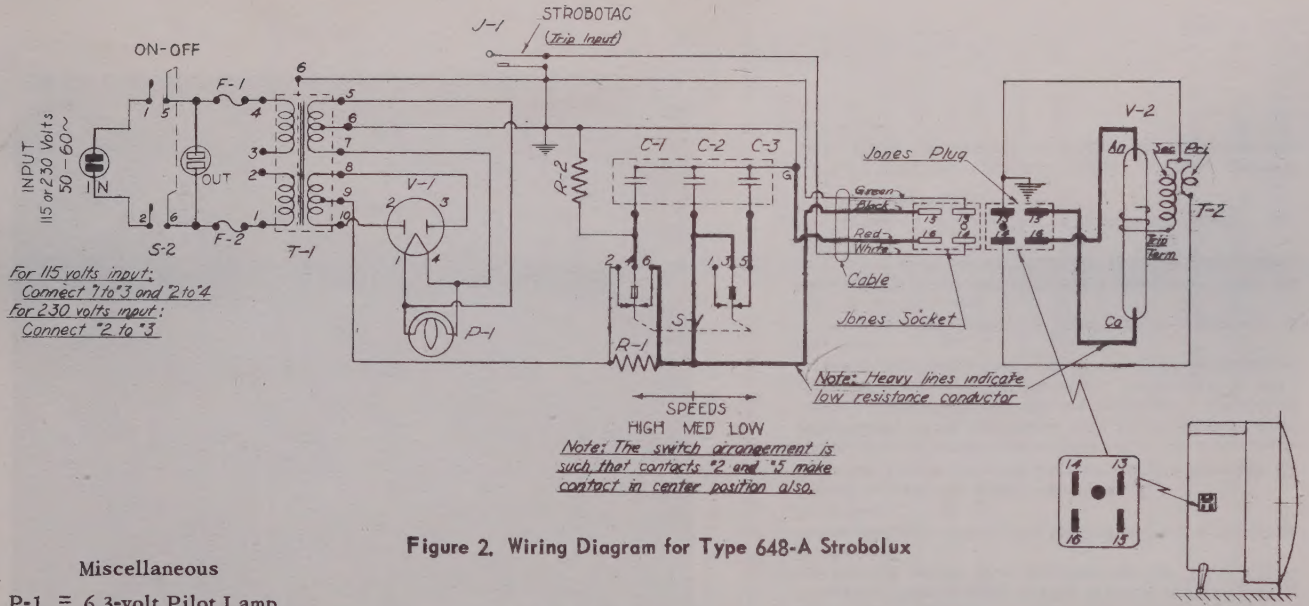

Figure 2. Wiring Diagram for Type 648-A Strobolux

PARTS LIST

Miscellaneous

P-1 = 6.3-volt Pilot Lamp
2LAP-939 Mazda No. 44

Resistors

R-1 = 3 kΩ — 2 in parallel, 60 watts each — REPO-1069

R-2 = 1 MΩ — 2 watts

Condensers

C-1 = 10 μf
C-2 = 2 μf
C-3 = 2 μf
} COLB-5

Fuses

F-1 = 1.6 amp. Slow Blow Type 3AG
F-2 = 1.6 amp. Slow Blow Type 3AG
} For 115-volt operation

F-1 = 0.8 amp. Slow Blow Type 3AG
F-2 = 0.8 amp. Slow Blow Type 3AG
} For 230-volt operation

Tubes

V-1 = RCA Type 523
V-2 = Strobolux Lamp Type 648-P1

Transformers

T-1 = Power Trans. 365-411
T-2 = Trip Coil 648-301-2

Switches

S-1 = D.P.D.T. 648-304
S-2 = D.P.S.T. SWT-1279

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